

What is claimed is:

1. A low density, substantially planar carbon fiber reinforced concrete building panel having an upper end, a lower end, and a substantially longitudinal axis defined between said upper end and said lower end, comprising:

an insulative core having an inner surface, an outer surface, an upper end, a lower end, and a plurality of perimeter edges, said foam core comprising at least one cut-out portion extending substantially between at least two of said plurality of perimeter edges;

5 a first concrete material positioned adjacent said outer surface of said foam core;

a first carbon fiber material positioned within said first concrete material;

10 a second carbon fiber material positioned within said at least one cut-out portion of said foam core and extending through said foam core beyond said outer surface and in operable contact with said first carbon fiber material;

at least one first reinforcing bar positioned proximate to said at least one carbon fiber material within said cut-out portion, and extending substantially between said upper end and said lower end of said foam core; and

15 a second concrete material positioned within said cut-out portion of said foam core, and extending substantially from said upper end to a lower end of said foam core.

2. The low density, carbon fiber reinforced concrete building panel of Claim 1, wherein said at least one carbon fiber shear strip is comprised of an interwoven grid of individual carbon fibers.

3. The carbon fiber reinforced concrete building panel of Claim 1, wherein said foam core is comprised of at least one of an expanded polystyrene, an extruded polystyrene, an extruded polypropylene and a polyisocyanurate.

4. The carbon fiber reinforced concrete building panel of Claim 1, wherein said at least one cut-out portion has a substantially triangular shape with an apex oriented toward said outer surface of said building panel.

5. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a second reinforcing bar positioned proximate to at least one of a plurality of perimeter edges of said concrete building panel.

6. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a third carbon fiber material positioned along a plurality of perimeter edges of said building panel to provide additional strength to said building panel.

7. The carbon fiber reinforced concrete building panel of Claim 1, wherein said at least one first reinforcing bar is comprised of a metallic rod having a diameter of at least about 0.25 inches.

8. The carbon fiber reinforced concrete building panel of Claim 1, further comprising at least one lift anchor interconnected to said building panel along at least one of said plurality of perimeter edges.

9. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a third reinforcing bar which is positioned proximate to at least one of a plurality of perimeter edges of said substantially planar concrete panel.

10. The carbon fiber reinforced concrete building panel of Claim 1, further comprising at least one of a window frame and a door frame positioned between said upper end and said lower end of said building panel and extending between said outer surface and said inner surface.

11. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a vapor barrier material positioned proximate to at least one of an interior surface and an exterior surface of said foam core.

12. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a weep tube positioned proximate to said foam core, wherein moisture is operatively drained from said building panel.

13. The carbon fiber reinforced concrete building panel of Claim 1, further comprising a stud positioned within said at least one cut-out portion, and extending beyond an inner surface of said foam core, said stud including at least one aperture to receive at least one of a conduit, a communications cable, a planar pipe and an electrical wire.

14. The building panel of Claim 13, wherein said stud is comprised of at least one of a metal, a fiberglass, a plastic, and a wood material.

15. The building panel of Claim 1, further comprising a cladding material interconnected to said first concrete material.

16. A method for fabricating a lightweight, concrete building panel, comprising the steps of:

- a) providing a form having an upper end, a lower end, and lateral edges extending therebetween;
- b) positioning a first concrete material into a lower portion of said form;
- c) positioning a first grid of carbon fiber material into said first layer of concrete material;
- d) positioning a foam core onto said first layer of concrete material, said layer of foam core having a plurality of cut-out reinforced sections, said reinforced sections

10 comprising a second grid of carbon fiber material extending into said first layer of concrete material and a reinforcing bar extending substantially along an entire length of said reinforced section and positioned proximate to said second grid of carbon fiber material.

- e) positioning a second layer of concrete within said plurality of reinforced sections; and
- 15 f) removing said lightweight, concrete building panel from said form.

17. The method of Claim 16, further comprising the step positioning a facing material over an interior surface of said foam core and said reinforced section.

18. The method of Claim 16, wherein said facing material is at least partially comprised of a concrete material.

19. The method of Claim 16, further comprising the step of positioning an interior frame within said form prior to said positioning a first concrete material step, wherein a frame of a window or a door may be provided.

20. The method of Claim 16, further comprising the step of positioning at least one lift anchor within said concrete building panel to facilitate the removal of said lightweight building panel from said form, and for installing said concrete building panel and a construction site.

21. The method of Claim 16, wherein said foam core is comprised of at least one of an expanded polystyrene material, an extruded polystyrene material, an extruded polypropylene and a polyisocyanurate.

22. The method of Claim 16, further comprising the step of interconnecting said first grid of carbon fiber material to said second grid of carbon fiber material and

interconnecting at least one of said first grid and said second grid into at least one of said first concrete layer and said second concrete layer.

23. The method of Claim 16, further comprising the step of reinforcing at least one of a plurality of perimeter edges of said concrete building panel with at least one of a reinforcing bar and a third grid of carbon fiber material.

24. The method of Claim 16, further comprising the step of vibrating said first concrete material, wherein a density of said first concrete material is increased.

25. A reinforced concrete building panel having an interior surface, an exterior surface, an upper end, a lower end, and lateral edges extending therebetween comprising:  
a first concrete layer;

5 a first reinforcing grid positioned within said first concrete layer;  
a foam core having an interior surface, an exterior surface, an upper end and a lower end and lateral edges positioned therebetween, said exterior surface in contact with said first concrete layer;

10 at least one cut-out portion positioned within said foam core, said cut-out portion including a second reinforcing grid which extends through said foam core and into said first concrete layer;

a second concrete layer positioned within said cut-out portion; and

at least one reinforcing rod positioned proximate to said second reinforcing grid.

26. The reinforced concrete building panel of Claim 25, wherein said at least one reinforcing rod is comprised of at least one of a metallic material.

27. The reinforced concrete building panel of Claim 25, wherein said foam core is comprised of at least one of an expanded polystyrene material, an extruded polystyrene material, an extruded polypropylene and a polyisocyanurate material.

28. The reinforced concrete building panel of Claim 25, wherein said first reinforcing grid and said second reinforcing grid are comprised of at least one of a carbon fiber material, a wire mesh material and a fiberglass material.

29. The reinforced concrete building panel of Claim 25, wherein said first reinforcing grid is operably interconnected to said second reinforcing grid and at least one of said first concrete layer and said second concrete layer.

30. The reinforced concrete building panel of Claim 25, further comprising a third reinforcing grid positioned proximate to at least one of a plurality of perimeter edges for increased structural strength.

31. The reinforced concrete building panel of Claim 25, wherein said at least one cut-out portion has at least one of a substantially triangular and a substantially rectangular cross-sectional shape.

32. The reinforced concrete building panel of Claim 25, wherein said at least one reinforcing rod is operably interconnected to said second reinforcing grid.

33. The reinforced concrete building panel of Claim 25, further comprising a lifting anchor interconnected to a perimeter edge of said reinforced concrete building panel to facilitate transportation and erection of said reinforced concrete building panel.

34. The reinforced concrete building panel of Claim 25, further comprising an interior cladding material interconnected to said interior surface of said foam core.

35. The reinforced concrete building panel of Claim 25, further comprising at least one of a window frame and a door frame positioned within said reinforced concrete building panel.

36. The reinforced concrete building panel of Claim 25, wherein said reinforced concrete building panel has a density of no greater than about 33 pounds per square foot.

37. The reinforced concrete building panel of Claim 25, further comprising a third reinforcing bar positioned along at least one perimeter edge of said reinforced concrete building panel.

38. The reinforced concrete building panel of Claim 25, wherein said foam core is comprised of a plurality of individual panels.

39. The reinforced concrete building panel of Claim 25, further comprising a plurality of spacers interconnected to said reinforcing rod to provide separation between said reinforcing rod and said foam core.

40. The reinforced concrete building panel of Claim 25, wherein said at least one reinforcing rod is under tension.

41. The reinforced concrete building panel of Claim 25, further comprising a thermal barrier material positioned proximate to at least said lateral edges to inhibit heat transfer in said concrete building panel.